

Appendix C. Justifications, methods, and budgets of inventory projects funded through the NPS Inventory and Monitoring Program for the San Francisco Bay Area Network of parks.

Database Manager - All SFBAN Parks (2001-2003)

Justification: In addition to the Inventory and Monitoring Coordinator, whose position will be covered by monitoring funds, the network agreed that we needed to focus on database management and additional data mining of existing resources. Although a tremendous amount of existing information on vertebrates and vascular plants was compiled during the initial data inventory phase of SFBAN study plan development, new data sources continue to emerge. These sources range from previously uncataloged voucher specimen collections to raw inventory datasets with no existing bibliographic documentation. Inventory workshop participants identified the continued collection of such information as a high priority for the network and as a crucial component in capturing the goal of 90% completeness for all vertebrates and vascular plants. The successful collection and management of this information for the SFBAN will require a centralized, coordinated effort. The Database Manager, in conjunction with the Inventory Coordinator and the steering committee, will oversee this effort.

Methods: The Database Manager will have several tasks to complete for the network.

1. The manager will continue to collect and compile new data from outside sources for NPSpecies, NRBib and ANCS+. The manager will identify and prioritize sources to seek information from, in conjunction with the steering committee, and then collect information systematically.
2. The coordinator will model a plan for the identification and use of newly identified voucher specimen collections, based on existing I&M National Program templates. This plan will address an approach for updating ANCS+ for NPS specimens. All new voucher specimen evidence will be updated in NPSpecies and new ANCS+ databases will be sent to the I&M Program national and regional offices. The plan will also include a strategy for annually updating the NRBib databases within the network of parks by identifying important reference materials housed outside of NPS collections including graduate student theses and dissertations and unpublished reports stemming from university- and government-based research projects conducted within park boundaries. New references will be updated in NPSpecies.
3. The manager will develop a protocol for populating Dataset Catalog with all new and existing inventory datasets.
4. The manager will work with SFBAN GIS specialists to ensure a standardized approach to the creation of metadata for all spatial datasets entered into Dataset Catalog.
5. Finally, the manager will work with SFBAN parks and all inventory contractors to insure the efficient integration and management of projects within the network. A significant component of this will be to insure that data are collected appropriately and meet the NPS standards.

Budget:

Personnel Services – 2.5 year GS-09 term	<u>\$52,000/year</u>
TOTAL	\$130,000

Vegetation Inventory – JOMU, EUON (2001)

Justification: Both JOMU and EUON have relatively small acreage and are bordered by developed land. In the case of JOMU, natural areas exist that act as a refuge for native species, both plant and animal. Little information is known about the species composition or distribution of species within these areas. The close proximity of these lands to developed and disturbed lands raise the potential for invasion by exotic species. At least one species of rare plant is known to grow at JOMU, but the potential for other species is high. The limited size and accessibility of these areas make survey work quick and cost effective. Not only can the areas be surveyed for the presence or absence of species, but the distribution of species of concern (weeds and rare plants) can be documented simultaneously. Initial sampling for the compilation of a vegetation map for JOMU can also be completed during this process.

Methods: Due to the limited size and accessibility of these lands, a complicated sampling design is not warranted. Systematic surveys can be conducted to identify all species growing in these areas, including horticultural, exotic, and rare plants. These surveys will begin early in the growing season and continue through the summer into the fall (April – September), to ensure that all potential species have been recorded. Sampling plots will be established in each of the vegetation types to gather quantitative information on vegetation characteristics. These plots will be used in the future to develop a vegetation map for the area. At least one voucher specimen for each species encountered will be collected to document the presence of these species in the areas. Both JOMU and EUON have areas that are primarily horticultural crops that were planted and are maintained as part of the cultural landscapes. These species will be documented through photographs rather than voucher specimens, since woody plants with large fruits are difficult to properly voucher.

Recommended Contractors: KEA Environmental, Ecosystems West Consulting Group

Products:

- Final report will include photos and descriptions of land cover types and plant communities present and a comprehensive plant species list.
- Voucher specimens submitted to a designated herbarium.
- Relational MS Access database reporting field and species data collected at sampling plots.
- GIS coverage of plot locations.

Budget:

Personnel Services - completion of surveys and establishment of plots through a contract	\$40,000
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TOTAL	\$40,000
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Vascular Plant Inventory of New Lands - PINN (2002-2003)

Justification: The objective of this study is to obtain composition and distribution information on plant species located on lands added to PINN in January 2000. These lands were previously managed by the Bureau of Land Management and little if any information has been collected on the composition or distribution of species. These new lands (~7000 acres) potentially contain new species and increase the distribution of current species known to occur within PINN. Initial inventory plots established at this phase could be used to help develop a vegetation map in the future, which is currently unavailable for these new lands. Additional plots will be established within the old boundary of PINN to document areas that were previously unsampled due to remoteness and inaccessibility.

Methods: A list of potential habitat types will be developed using the Manual of California Vegetation (Sawyer, Keeler-Wolf 1995). A grid will be placed over PINN and plots will be randomly located within all lands to be sampled. A stratified random technique will be applied to ensure that a sufficient number of plots are placed in each of the vegetation classification types that occur on these lands. At each of the plot locations, vegetation alliance and species composition data will be collected using methods as described previously in Section II, Step 3 of this report. Voucher specimens of new species or species with expanded distribution will be collected during this process. These specimens will be accessioned and added to PINN's herbarium. Data collected on these plots will be entered into a database for future use in the compilation of a vegetation map.

Budget:

Personnel Services - one GS-06 and one GS-05 for 6 months over two years (1 year total time for each)	\$50,000
Equipment / Supplies	\$1000
Transportation - GSA vehicle and gas	\$4000
TOTAL	\$55,000

Rare Plant Inventory – GOGA, PORE (2001-2004)

Justification: Successful management of rare plants requires comprehensive information on the locations, size, and vigor of all plant populations to be managed. The U.S. National Park Service Management Policies state: “The Service will identify all threatened and endangered species within park boundaries and their critical habitat requirements (U.S. National Park Service Management Policies, 2-78 ed., p. IV-II).” The NPS does not have current, comprehensive information on the listed plants in PORE or GOGA.

Methods: This project will begin with an assessment of all of the rare plants known, or with potential, to occur in PORE and GOGA (Appendix D). Each species will be evaluated in terms of its habitat requirements. Areas within PORE and GOGA with potential to support the taxa will be identified using the vegetation map, aerial photographs, and the past experience of CNPS members, local botanists and resource management personnel. Surveys will be floristic in nature (e.g., all vascular plants seen will be identified), which ensures that rare plants, even if they are not identified as target species, are not overlooked. Surveys will be conducted over a 4-year period to ensure that all rare annual plants are documented. Comprehensive surveys of all species in both parks would be cost-prohibitive at this time. The approach, therefore, will be to prioritize species, based on significance of listing status and completeness of survey efforts to date. All rare plant occurrences encountered during surveys will be documented using CNPS data sheets and mapped using a GPS. Data will be entered into an existing rare plant database for use in a GIS system. Field work will be conducted between the months of April and July, beginning with PORE lands and GOGA lands administered by PORE in FY2001.

Products:

- Annual reports will summarize status and distribution of targeted rare plant species, analyze threats to rare plant populations, and recommend long-term monitoring strategies.
- MS Access database containing all field data collected during rare plant surveys.
- GIS coverages and associated metadata of rare plant locations and areal extent

Budget:	<u>GOGA</u>	<u>PORE</u>	<u>TOTAL</u>
Personnel Services - one full time GS-07 term biological technician and one GS-05 seasonal (6 months) biological technician each year	\$56,832	\$56,832	\$113,664
Equipment / Supplies	\$1,000	\$1,000	\$2,000
Transportation - GSA vehicle and gas	\$4,000	\$4,000	\$8,000
TOTAL	\$61,832	\$61,832	\$123,664
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NPS contribution through I&M funds:	\$54,453		

Salt Marsh Harvest Mouse and Point Reyes Jumping Mouse Inventories – GOGA, PORE (2004)

Justification: Successful management of rare mammal species requires comprehensive information on the locations, size, and vigor of all mammal populations to be managed. The federally endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) has lost significant parts of its range from development and filling of tidal marshes in the San Francisco Bay Area. Distribution maps for the salt marsh harvest mouse indicated that this species was located along San Francisco Bay and not in coastal habitats. In 1992, during a general inventory of terrestrial mammals at GOGA, biologists discovered an adult female and three juvenile salt marsh harvest mice at Rodeo Lagoon. These findings emphasized the need to complete surveys for salt marsh harvest mice at GOGA and expand surveys to include PORE. Although PORE does encompass suitable habitat for the salt-marsh harvest mouse, no systematic surveys have been conducted and there are no records of its presence there.

In the late 1940's, the endemic Point Reyes jumping mouse (*Zapus trinotatus*) was reported in coastal locations of west Marin County from the Rodeo Valley in GOGA to PORE. Recent captures have occurred at PORE (G. Fellers personal communication), but not enough data has been gathered to ascertain the abundance or distribution of this species at PORE. Surveys of coastal sites in southern Marin County did not detect Point Reyes jumping mice in formerly identified locations. The Point Reyes jumping mouse represents the southern-most extent of the Pacific jumping mouse. It is known from only 10 localities, all of which occur within PORE and GOGA, and is a CDFG species of concern.

Methods: The purpose of this survey is to inventory the coastal lagoons and uplands for both species to determine the extent of their range in GOGA and PORE. Surveys will be conducted using live traps, specifically Sherman box traps. Pitfall traps will be used if determined to be necessary based on field observations. In potential salt marsh harvest mouse habitat, study points will be established along transects at 5-m intervals that encircle the marshlands and along transects placed perpendicular to the wetlands. In potential Point Reyes jumping mouse habitat (i.e., grassy marshlands), study points will be establish along paired 50 m transects at 5-m intervals. Surveys will be conducted over a 1-year period to ensure that detection is maximized. All rare mammal occurrences during the surveys will be documented and mapped using a GPS. Data will be entered into a database for use in a GIS system.

Recommended Contractors: USGS-WERC

Budget:	<u>GOGA</u>	<u>PORE</u>	<u>TOTAL</u>
Personnel Services – full time GS-05 temp biological technician	\$11,250	\$11,250	\$22,500
Equipment / Supplies	\$500	\$500	\$1,000
Transportation (GSA vehicle and gas)	\$750	\$750	\$1,500
TOTAL	\$12,500	\$12,500	\$25,000

Bat Inventory (structures) – EUON, GOGA, JOMU, PINN, PORE (2003)

Justification: The objective of this project is to determine presence/absence, species diversity, and distribution of bats in relation to human structures potentially subject to modification, where bats are most vulnerable to human impacts. Manmade structures, including buildings, bridges, mines, military fortifications, etc. provide increasingly important habitat for sensitive bat species whose native habitats have been altered or destroyed to the extent that they no longer provide suitable habitat. Bat inventory techniques are highly specialized and inventories for other mammalian species do not adequately inventory for bats. Furthermore, approximately two-thirds of bat species expected to occur within developed environments in parks are considered sensitive, vulnerable to human impacts and qualify for listed as threatened or endangered species. Hundreds of structures at GOGA and PORE require surveying with fewer at EUON, JOMU and PINN. MUWO, natural habitats within the Presidio and Marin Headlands military fortifications at GOGA have already been surveyed for bats. Bat inventories of Fort Baker and Alcatraz at GOGA are expected to be completed prior to 2003.

Methods: Survey all manmade structures for potential for bat access and use. Survey all buildings, bridges, mines, unsurveyed military fortifications, orchards and sentinel trees with potential for bat use for evidence of bats, including presence of bats, stains and guano. Prepare a database and GIS mapping of status of all structures surveyed. Limited acoustic surveys and spotlighting may be utilized to determine species and relative abundance in developed areas with particularly high potential for bat use.

Recommended Contractors: USGS-WERC

Budget:	<u>GOGA/PORE</u>	<u>PINN/JOMU/EUON</u>	<u>Total</u>
Personnel Services - GS-07 seasonal for 8 months; contract for identification of bat acoustical recordings	\$16,500	\$5,500	\$22,000
Equipment / Supplies - laptop computer, Anabat detector, batteries	\$2,000	\$2,000	\$4,000
Transportation / Travel - GSA vehicle, gas, and per diem	\$2,500	\$1,750	\$4,250
Total	\$21,000	\$9,250	\$30,250

Small Mammals and Herpetofauna Inventory – PINN (2003)

Justification: No systematic surveys for small mammals, reptiles, or amphibians have been conducted at remote areas or on new lands acquired by PINN. Newly acquired lands encompass almost 8,000 acres and several habitat types. The vertebrate species list for the new lands is 0% complete and is limited to incidental observations on the more remote lands within the park.

Methods: Conduct inventories for small mammals and herpetofauna using Fisher arrays of small mammal traps, cover boards, pit fall traps, and Trailmaster cameras in remote areas of PINN and on newly acquired lands. Arrays to be established will be stratified by habitat type. Each Fisher array of traps, and cover boards would be set up for approximately 4 weeks over one year in order to ascertain seasonal variations. Although no vegetation map is available for the new lands, aerial photos will be available. It is expected that approximately 6 arrays would be necessary to adequately survey the new and remote lands. Fisher array supplies for PINN will be taken from EUON and JOMU after inventories are completed there.

Recommended Contractors: USGS-WERC

Budget:

Personnel Services - two GS-05 seasonals for 5 months each	\$20,000
Equipment / Supplies - film, Fisher arrays, Sherman traps, cover boards	\$1,480
Transportation / Travel - GSA vehicle, gas, and per diem	\$3,750
TOTAL	\$25,230

Small Mammals and Herpetofauna Inventory – EUON, JOMU (2001)

Justification: No systematic surveys for small mammals, reptiles, or amphibians have been conducted at either JOMU or EUON. The few observational records and reports that exist do not provide adequate documentation or comparison to other park units. It is estimated that the species list for vertebrates are 0 to 20% complete.

Methods: Inventories for small mammals and herpetofauna will be conducted using Fisher arrays of small mammal traps, cover boards, pit fall traps, and Trailmaster cameras in JOMU's Mt. Wanda area. Two arrays will be established stratified by habitat type. The historic residential areas of JOMU and EUON will be inventoried using Sherman traps and cover boards at approximately 10 traps and 2 cover boards per acre. Arrays, traps, and cover boards would be set up for approximately 4 weeks over one year in order to ascertain seasonal variations.

Recommended Contractors: USGS-WERC

Products:

- Report will provide complete species list and photo documentation of species encountered. Incidental mortalities will be sent to UC Berkeley Museum of Vertebrate Zoology for appropriate vouchering.
- GIS coverage of all sampling locations and associated metadata.
- MS Access database of all collected field data.

In Kind Costs: USGS-WERC

Supplies	<u>\$1,150</u>
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TOTAL	\$1,150
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Budget:	<u>JOMU</u>	<u>EUON</u>	<u>TOTAL</u>
Personnel Services - contract	\$2,800	\$1,400	\$4,200
Equipment / Supplies - film, Fisher arrays, Sherman traps, cover boards, camera setup	\$3,300	\$1,700	\$5,000
Transportation - GSA vehicle and gas	<u>\$275</u>	<u>\$275</u>	<u>\$550</u>
TOTAL	\$6,375	\$3,375	\$9,750

Riparian Aquatic Species Inventory – PINN (2001-2002)

Justification: Current knowledge of this vital ecosystem component at PINN is lacking. PINN has no verified information on fish species occurring within the park. Additionally, no verified information exists for two State Species of Special Concern (SSC) aquatic invertebrates that occur at PINN. PINN has only poor distribution data for the federally threatened California red-legged frog occurring in their riparian areas. Inventorying these aquatic taxa concurrently will have an enormous cost saving. Due to the topography of PINN there are few flat areas, so development has been focused in relatively level riparian areas. These activities continue to have a profound impact on PINN's riparian systems primarily by focusing the majority of visitor use into less than 7% of the land area and altering flood events. Having base line information of species presence and distribution data on listed species will greatly assist the park management.

Methods: All water courses will be surveyed (~35 miles). Sampling will occur from January through September for two years. Amphibians will be inventoried by walking transects along stream corridors and netting species for in-hand identification. For red-legged frogs, sites will be identified as adult, egg, tadpole, or metamorph habitats, since each portion of the life cycle requires different elements. Streams that will be surveyed are generally narrow and shallow, allowing the use of snorkel surveys to inventory and assess distribution of fish species. Surveys will be stratified by habitat type (pool, run, riffle) and by stream size class using physical stream data recently collected by Park resource staff. Electrofishing will be conducted to sample physically complex habitat units that preclude snorkel surveys and to collect fish voucher specimens. Locations of identified species will be recorded using a GPS unit in order to determine species distribution. Data reflecting the relative abundance of fish species will not be collected. Fifteen aquatic invertebrate samples will be collected per year from five sites, following the CDFG Rapid Bioassessment Protocol. This will not only allow for location of SSC invertebrates, but will supplement current water quality monitoring efforts. These samples will be sent to a qualified laboratory for identification and analysis.

Recommended Contractors: Jon Lee Consulting, CDFG Aquatic Bioassessment Laboratory

Products:

- A complete list of fish species and voucher specimens for PINN.
- GIS coverages of amphibian and fish species distribution.
- GIS coverages of California red-legged frog distribution by each life cycle component (adults, tadpoles, egg masses).
- Descriptions of habitat characteristics for red-legged frog habitats.
- Voucher collection of aquatic invertebrates. Species list of aquatic invertebrates and community composition related to water quality conditions.

Budget:

Personnel Services - one fulltime GS-05, one part time GS-05, contract for aquatic invertebrate identification and analysis	\$58,100
Equipment / Supplies - laptop computer, GPS unit, specimen prep, wet laboratory, binoculars	\$8,650
Transportation - GSA vehicle and gas	\$1,750
TOTAL	\$68,500

Coastal Biological Resources Inventory – GOGA, PORE (2004)

Justification: PORE and GOGA have a poor understanding of the distributions, abundance, and ranges of variation over time and space of the coastal resources under their stewardship. The NPS is charged with preserving and protecting these resources in an unimpaired state, yet it is impossible in most cases to determine whether these resources have been compromised due to a lack of reference data. Even in the case of a catastrophic event, such as an oil spill, when it is clear that coastal resources have been damaged, the NPS can only determine when resources have been restored if there is existing information on these resources in their previous states. Three oil spill incidents during the winters of 1996-1997 and 1997-98 along the parks' coastline killed thousands of seabirds, including an estimated 10,000 common murrelets, and illustrated the reality and potential consequences of a major oil spill. Boat wrecks are also an immediate threat to marine resources. PORE alone averages three boat wrecks a year.

One of the most useful informational tools for management of park resources is a Geographic Information System (GIS). This inventory would improve the GIS at PORE and GOGA by adding the following GIS database themes to the current system: marine intertidal community composition (fish, invertebrates, and algae), nearshore kelp forests and intertidal reefs, areas critical to wildlife species of special interest, including seal/sea lion haulouts and seabird rookeries, coastal terrestrial vegetation, sensitive ecological habitats, coastal geomorphology, intertidal and shallow subtidal benthic substrate type, beach exposure, freshwater streams, and archaeological resources.

Methods: A field protocol and database for a coastal inventory has been developed and implemented at Glacier Bay National Park and Preserve (GLBA). These tools will be adapted to fit the biological and geological resources and needs of resource managers at PORE and GOGA. The coastal inventory would encompass almost 80 miles of coastline at PORE and 28 miles of coastline at GOGA.

The coastal inventory would employ a polygon method, which has been tested by GLBA for its accuracy and repeatability. The polygon method entails walking the coastline and dividing it into "segments" based primarily upon changes in the driving forces of the intertidal ecosystem – surface substrate type, beach slope, and (after-the-fact, during data processing activities) predominant aspect and relative exposure to physical disturbance. Within each of these segments information is collected about intertidal biota (fish, invertebrates, and algae), adjacent upland vegetation, streams draining into the segment, surface substrate, and other selected resource attributes. Segments are also documented with ground photographs and are carefully delineated using high-resolution and up-to-date aerial photography. GPS equipment is used only to collect known reference points for use in georeferencing the aerial photography. Data processing for the polygon method involves computerized entry of data from the field forms, digitally processing and incorporating the ground photos into a database, georeferencing scanned aerial photographs into a GIS system, and digitizing segments as discrete polygons. All information collected is stored in an easily accessible format as a linked ArcView and Microsoft Access GIS.

Budget:	<u>GOGA</u>	<u>PORE</u>	<u>TOTAL</u>
Personnel Services - one GS-07 biologist, one GS-05 biologist, contract for database development, and 10% time for PORE GIS Specialist	\$22,700	\$43,900	\$66,600
Equipment / Supplies	\$300	\$600	\$900
Transportation - GSA vehicle and gas	\$2,000	\$4,000	\$6,000
TOTAL	\$25,000	\$48,500	\$73,500
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NPS contribution through I&M funds:	\$55,000		

Subtidal and Deep Water Biological Resources Inventory – GOGA, PORE (2003)

Justification: The marine environment along the PORE and GOGA coastlines is one of the most biologically diverse and productive marine regions in the world. The two parks share boundaries with Cordell Banks, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries. In addition, several marine areas along the Point Reyes coastline receive protection under state designation.

PORE and GOGA have substantial interests in the long-term health and preservation of these significant marine resources. A substantial lack of scientific information, however, prevents the parks from managing these marine resources effectively. Benthic and subtidal habitat mapping in the nearshore waters of PORE and GOGA is the most committed step that the parks can take to help better understand and monitor their marine resources. Habitat mapping will allow for the assessment of habitat change due to natural or anthropogenic factors, assist in habitat-based fish and invertebrate sampling, monitoring and protecting of important marine habitats (spawning grounds, marine reserves), design and location of future marine reserves, assessment of aquaculture projects, and species distribution. A major goal of the habitat mapping project will be to develop predictions as to the distribution of marine species and resources from those physical and biotic parameters that can be remotely sampled. Marine species that will be targeted will be marine fish and keystone marine invertebrates and plants, such as black abalone, sea urchins, and kelp. Rather than vertebrates, invertebrate species form the foundation for much of the food web of the marine ecosystem. Consequently these invertebrates will be included in this inventory.

Methods: Efforts undertaken by the Monterey Bay National Marine Sanctuary (MBNMS) to characterize the habitats of the continental shelf between Monterey and San Francisco, with very high resolution at the Big Creek Ecological Reserve on the Big Sur Coast, will serve as a model for mapping at PORE and GOGA.

Partnerships with the US Geological Survey, University of California system, California State University system, California Department of Fish and Game, National Marine Fisheries Service, Environmental Protection Agency, and the Monterey Bay, Cordell Banks, and Gulf of the Farallones National Marine Sanctuaries will be established to accomplish the habitat mapping project.

The mapping project will be completed in several steps:

- 1) identify, collect, evaluate, and convert all existing seafloor substrate and bathymetry data from outside agencies to digital GIS format
- 2) convene a series of workshops with collaborating agencies and potential contractors to develop a strategic plan to complete seafloor substrate and bathymetry data, adopt a habitat classification scheme, set criteria for map scale and resolution, prioritize marine sites to be mapped, and identify additional funding sources
- 3) collect seafloor substrate and bathymetry data where information does not exist using best and most appropriate technology (i.e. side-scan sonar, LIDAR technology, and multi-beam depth sounders)
- 4) create an initial set of “baseline” habitat maps for the nearshore waters of PORE and GOGA by applying the habitat classification scheme to seafloor habitat data in GIS format
- 5) ground truth baseline maps for accuracy and value through random, stratified sampling of habitat types for biotic communities (marine fish and invertebrates) and substrate using sediment cores and grabs, drop cameras, submersibles, and/or ROVs
- 6) use GIS to combine geophysical habitat data (depth, slope, aspect, and slope) with species distributions to refine the benthic and subtidal habitat map
- 7) finalize GIS layers and databases

Completion of the habitat mapping project will be a very costly effort. Funds from the I&M budget will help initiate this project and leverage funding from other sources. The goal is to map all the nearshore waters of PORE and GOGA, which totals approximately 35 square miles. Resource managers concur that Tomales Bay, Drake’s Estero, Tomales Point, Point Reyes Headlands, and Double Point are priority sites for mapping. Partnerships with the National Marine Sanctuaries may help expand mapping efforts to include the adjacent Sanctuary waters as well.

Recommended Contractors: CSU Monterey Bay, Moss Landing Marine Laboratory

Budget:

Estimated Cost: \$350,000

NPS contribution through I&M funds: **\$25,000**

Bird Inventory – PINN, JOMU, EUON (2001)

Justification: No systematic surveys for birds have been conducted at either JOMU or EUON, or on the new lands of PINN. The few observational records and reports that exist do not provide adequate documentation or comparison to other park units. It is estimated that the species list for vertebrates are 0 to 20% complete.

Methods: Repeatable point count censuses will be conducted to inventory landbirds at PINN, JOMU, and EUON, following a standardized variable circular plot protocol as recommended by the NPS I&M program and described in Reynolds *et al.* (1980) and Ralph *et al.* (1993). The repeatable point count method has been used by the Point Reyes Bird Observatory to inventory birds at PORE and GOGA since 1995. Transects consisting of multiple point count census stations spaced 200-250 m apart from one another will be established. At each census station a five-minute census will be conducted. All birds detected within a five-minute period at each station will be recorded, and the distance from the center of the census point to each detection will be measured separately. Flyover birds in the census area will be recorded separately. The type of detection (song, visual or call) will also be noted for each individual, in that hierarchical order. Counts begin around local sunrise and continue for no more than four hours in order to restrict the census to peak singing hours. Counts will not be conducted during poor weather conditions, when bird activity levels and detection probabilities are reduced. All point count stations will be visited three times between late April and early July, with a minimum of 10 days between visits, to increase detection probabilities of less common species. Additionally surveys will be conducted in the winter months at PINN to detect winter residents, but will not follow the variable circular plot survey method since birds do not sing or hold territories in the winter months. Instead, birds will be surveyed using timed area searches in various habitat types.

Recommended Contractors: Point Reyes Bird Observatory

Products:

- Complete list and relative abundance of bird species occurring within each park, including species seen at each census station.
- GIS coverage of point count census stations and associated metadata.
- MS Access database of all collected field data.

Budget:	<u>JOMU/EUON</u>	<u>PINN</u>	<u>TOTAL</u>
Personnel Services - contract	\$2,650	\$10,500	\$13,150
Equipment / Supplies	\$200	\$200	\$400
Transportation	\$200	\$400	\$600
TOTAL	\$2,400	\$9,600	\$14,150
